

SPECIFICATION

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0008] contained in the specification of the above-identified patent application with the following annotated replacement paragraph [0008].

[0008] Figures 1 through 3 illustrate the present invention power end seal 10, and are referred to in this description. The present invention power end seal 10 is designed for, among other purposes, use in gear boxes (not shown) for reciprocating pumps to retain the lubricants used within the gear boxes. Conventional seals used in gear boxes can exhibit special sealing concerns due to high duty cycles, extension rods on pump power ends, and other rod and shaft misalignment in low system pressure applications. The present invention power end seal 10 is a composite seal that optimizes the properties of elastomers and plastic or elastomer composite materials. The present invention power end seal 10 is generally formed in the shape ~~[[comprised]]~~ of ~~[[a]]~~ an asymmetrical U-shaped, circular seal body 12 having a plurality of arced or tangentially-positioned ribs 14 disposed between an inner diameter wall 16 and the outer diameter wall 18. Further, the present invention power end seal 10 includes an inner diameter dynamic seal 20 consisting of a plastic or elastomer filled composite material and the outer diameter rubber static seal 22. The plurality of ribs 14 are preferably made of the same elastomer material from which the seal body 12 is comprised. The U-shaped circular seal body 12 is asymmetrical in that the outer diameter wall 18 is longer in length as compared to the inner diameter

wall 16, as observed in an extended length section 18b. However, each wall 16, 18 includes an equal length section, 16a, 18a, both of which are equal in linear length. The extended length section 18b extends in length, past the equal length section 18a. It is within the equal length sections, 16a, 18a, that the ribs 14 are engaged. The extended length section 18b provides the improvement of providing additional surface area 18b of the outer diameter static seal 22 to contact and become affixed, or constrained axially, within the packing bore or gland (not shown) to allow for additional flexibility in the movement of the inner diameter dynamic seal 20. The extended length section 18b provides another distinct advantage when used in "stacked" applications. When using the present invention power end seal 10 in "stacked" or stacking applications, where other seal components (not shown) may be axially stacked on top of the seal body 12, the extended length section 18b, by virtue of its longer length, provides additional spacing between the stacked component (not shown) and the inner diameter dynamic seal 20, to prevent contact and interference between the stacked component (not shown) and the dynamic seal 20. The added spacing between the stacked component (not shown) and the dynamic seal 20 also allows the dynamic seal 20 to move with greater flexibility and to maintain its seal with the connecting rod (not shown). One of the primary benefits of the present invention power end seal 10 is its flexibility to compensate for run-out, or eccentricity. In other words, the power end seal 10 can withstand a large amount of deflection and still maintain static interference in the packing bore (not shown). Another benefit of the present invention power end seal 10 is that it can withstand the above-described deflection while minimizing radial squeeze to reduce heat build up and reduce seal wear. The inner dynamic

seal 20 being comprised of plastic or elastomer filled composite material, i.e., for example PTFE, bronze filled PTFE, carbon filled PTFE or aramid fiber filled HNBR (rubber), significantly reduces the wear of the dynamic seal 20 of the seal body 12 while maintaining an effective and flexible dynamic seal 20 and static seal 22. The plurality of tangentially positioned ribs 14 provide flexible tension between the inner wall 16 and outer wall 18 of the power end seal 10 to maintain static interference in the packing gland (not shown), which is especially useful where there is no system pressure in the power ends of the gear boxes (not shown). An open, asymmetrical u-shaped channel portion 28 is defined by the internal space between the inner diameter wall 16 and the outer diameter wall 18. A seat portion 23 is defined by the external surface of the seal body 12 affixed to and disposed between a lower end of the inner diameter wall portion 16 and a [[the]] lower end of the outer wall portion 18. The seat portion 23 is perpendicularly affixed to the wall portions 16, 18 of the seal body 12, such that the axial alignment 16x of the inner wall 16 is generally parallel with respect to the axial alignment 18x of the outer wall 18. During the implementation and use of the present invention power end seal 10, the inner diameter wall 16 and the outer diameter wall 18 remain generally parallel with one another, wherein such alignment obviates the need for a back-up ring or other mating components necessary to combat deflection of seals having tapered or inclined cross sections. The plurality of ribs 14 are tangentially positioned between the inner diameter wall 16 and the outer diameter wall 18 and are attached to a top surface 30 of the channel portion 28. The present invention power end seal 10 can be used in operating temperatures ranging from -20 to 300 degrees F. Various parts of the power

end seal **10** are produced from the processes of compression, injection or transfer molded elastomer. Adhesion of the inner diameter wall **16** and outer diameter wall **18** is achieved by adhesive bonding in the molding process for dissimilar materials. Similar materials such as elastomer to fiber filled elastomer is generally achieved by the process of co-vulcanization. The use of higher modulus materials for the inner diameter dynamic seal surface **20**, generally provides that the inner dynamic seal surface **20** does not pull away from the connecting rod (not shown) during operation of the pump (not shown). Rather, diametrical tension causes the inner diameter dynamic seal **20** to travel with the connecting rod (not shown) thus reducing leakage within the gear box (not shown). The use of plastic or ~~[[of]]~~ elastomer filled composite material on the inner diameter dynamic seal **20** reduces the footprint or exposure of the higher friction elastomer used to form the seal body **12**. Additionally, the present invention power end seal **10** discloses a plurality of ~~[[various]]~~ lip profiles **24**, **26** at the upper ends of the inner wall **16** and outer wall **18**. Different lip profiles can be formed to the inner wall **16** and outer wall **18** depending upon the specific application for the power end seal **10**. The inner wall **16** and the outer wall **18** are not flat, but rather include lip profiles **24**, **26** which protrude outwardly, away from the walls **16**, **18**. The first lip profile **24** extends outward radially from the inner diameter surface of an upper end of the inner wall **16**. The second lip profile **26** extends outward radially from the outer diameter surface of an upper end of the outer wall **18**. The lip profiles **24**, **26** are attached to the present invention power end seal **10** such that the circular, asymmetrical u-shaped seal body **12** includes the first lip profile **24** affixed to the upper end of the of the inner composite dynamic seal **20** and the second lip profile **26** is

affixed to the upper end of the of the extended section 18b of the outer rubber static seal 22. The first lip profile 24 protrudes or bulges from the inner diameter dynamic seal surface 20 to make additional sealing contact with the connecting rod (not shown), as the connecting rod engages the inner diameter dynamic seal surface 20. The second lip profile 26 protrudes or bulges from the outer diameter rubber static seal surface 22 to make additional sealing contact with the packing bore or gland (not shown). It will be appreciated that these and other embodiments may be provided as a power end seal for use in sealing gear boxes of heavy duty reciprocating pumps. Additional embodiments become readily apparent in view of the present invention as described herein above. Having described the invention above various modifications of the techniques, procedures and materials will be apparent to those skilled in the art. It is intended that all such variations within the scope and spirit of the appended claims be embraced thereby.